

WHAT IS CLAIMED IS:

- 1 **1.** An optical coupler comprising:
 - 2 a housing with a rotatable distal face and a stationary proximal
 - 3 face, the distal face having an eccentric port and a central port
 - 4 a lens disposed inside the housing to intercept a rotating collection
 - 5 beam emerging from the eccentric port and to re-direct the
 - 6 collection beam to a focus proximal to the lens as the collection
 - 7 beam rotates; and
 - 8 a beam re-director disposed between the lens and the distal face,
 - 9 the beam re-director being oriented to direct a delivery beam
 - 10 toward the central port.
- 11 **2.** The optical coupler of claim 1, further comprising a light source disposed to
- 12 direct a delivery beam radially inward to the beam re-director.
- 13 **3.** The optical coupler of claim 1, wherein the beam re-director comprises a
- 14 penta-prism.
- 15 **4.** The optical coupler of claim 1, wherein the beam re-director comprises a
- 16 prism.
- 17 **5.** The optical coupler of claim 1, wherein the beam re-director comprises a
- 18 mirror.
- 19 **6.** The optical coupler of claim 1, further comprising a detector disposed at the
- 20 focus for receiving the rotating collection beam.
- 21 **7.** The optical coupler of claim 1, wherein the lens is configured to focus the
- 22 collection beam on an axis of rotation of the distal face.
- 23 **8.** The optical coupler of claim 1, wherein the lens is configured to focus the
- 24 collection beam off an axis of rotation of the distal face.
- 25 **9.** The optical coupler of claim 1, wherein the lens comprises an axicon lens.

- 26 **10.** A system for identifying vulnerable plaque, the system comprising:
- 27 a rotating catheter having a collection fiber and a delivery fiber
- 28 extending therethrough;
- 29 a housing with a rotatable distal face and a stationary proximal
- 30 face, the distal face having an eccentric port and a central port
- 31 a lens disposed inside the housing to intercept a rotating collection
- 32 beam emerging from the eccentric port and to re-direct the
- 33 collection beam to a focus proximal to the lens as the collection
- 34 beam rotates; and
- 35 a beam re-director disposed between the lens and the distal face,
- 36 the beam re-director being oriented to direct a delivery beam
- 37 toward the central port.
- 38 **11.** The system of claim **10**, further comprising a light source disposed to direct a
- 39 delivery beam radially inward to the beam re-director.
- 40 **12.** The system of claim **10**, wherein the beam re-director comprises a penta-
- 41 prism.
- 42 **13.** The system of claim **10**, wherein the beam re-director comprises a prism.
- 43 **14.** The system of claim **10**, wherein the beam re-director comprises a mirror.
- 44 **15.** The system of claim **10**, further comprising a detector disposed at the focus
- 45 for receiving the rotating collection beam.
- 46 **16.** The system of claim **10**, wherein the lens comprises an axicon lens.